

Rainfall Observations by the Airborne Dual-Frequency Precipitation Radar during CAMEX-4

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Following the successful Precipitation Radar (PR) of the Tropical Rainfall Measuring Mission, a new airborne, 14/35 GHz rain profiling radar, known as APR-2, has been developed as a prototype for an advanced, dual-frequency spaceborne radar for the TRMM follow-on mission – the Global Precipitation Mission (GPM). This airborne instrument is capable of making simultaneous measurements of rainfall parameters, including co-pol and cross-pol rain reflectivities and vertical Doppler velocities, at 14 and 35 GHz. Furthermore, it also features several advanced technologies for performance improvement, including real-time data processing, low-sidelobe dual-frequency pulse compression, and dual-frequency scanning antenna.

During August and September of 2001, this airborne radar was deployed on the NASA DC-8 aircraft in the Fourth Convection and Moisture Experiment (CAMEX-4). CAMEX-4 was a major US field campaign to study Tropical Storms and Hurricanes off the coast of Florida, with participation by NASA, NOAA, NCAR, and several universities. The primary objectives of APR-2 in this experiment were to study the evolution and structures of tropical storms and convective systems and to build up the data base for supporting the GPM rain radar algorithm development. The information gathered by APR-2 will allow the determination of rain rate, vertical motion, and location of melting ice along the DC-8 flight track at all altitudes below the aircraft. During CAMEX-4, the first-ever, simultaneous 14/35-GHz rain profiling data set at identical resolutions were obtained by APR-2.

This paper is being structured into two parts, with the first part summarizing the APR-2 system design and giving an overview of the system hardware configuration, and the second part summarizing the preliminary field test results on the radar system performance as well as some rain observations made during CAMEX-4.

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